Los Peñasquitos Lagoon Sediment Basin
Monitoring & Maintenance Plan

Project Background & Problem Statement

Background**.** Part of the Torrey Pines State Reserve in northern San Diego County, the Los Peñasquitos Lagoon (LPL) is a 1.6 km^2 coastal lagoon that receives freshwater drainage from a 255 km^2 watershed comprised of three major canyons (Carroll Canyon, Los Peñasquitos Canyon, and Carmel Canyon). Both the lagoon and its watershed are part of the Los Peñasquitos Lagoon Hydrological Unit (hydro. unit 906.100) and are located within the San Diego Watershed Unified Watershed Assessment (UWA) Category 1, Catalog # 18070304. Given the status of "Preserve" by State Parks, LPL is one of the remaining native salt marsh lagoons in California, providing and home to several endangered species (e.g. Least Bell's Vireo, Belding's Savannah Sparrow, Light Footed Clapper Rail, Salt Marsh Daisy). LPL also serves as a stopover for the Pacific Flyway, offering migratory birds a safe place to rest and feed during their journeys, as well as providing refuge for coastal marine species that use the lagoon feed and hide from predators. Listed as a Critical Coastal Area, LPL it the closest lagoon to the only two Areas of Special Biological Significance located within San Diego: the San Diego Marine Life Refuge and the San Diego-La Jolla Ecological Reserve. LPL is currently under consideration for National Estuarine Research Reserve status under NOAA, as well as a Wetland of International Significance under the United Nation's Ramsar Program.

Problem Statement. Industrial development and urban encroachment in the watershed and along the periphery of the lagoon has altered the hydrology of the western portion of the watershed and upset the geomorphic equilibrium of the three main tributaries (Carroll, Los Peñasquitos and Carmel Creeks) that empty into the lagoon, resulting in rapid sedimentation in the lagoon/watershed interface and within lagoon channels. Impacts associated with such rapid sedimentation include: reduced tidal mixing within lagoon channels, degradation and (in some cases) net loss of riparian and salt marsh vegetation, increased vulnerability to flooding for surrounding urban and industrial developments, turbidity associated with siltation in lagoon channels, and constriction of a main wildlife corridor. The Los Peñasquitos Lagoon Enhancement Plan and Program (LPLEPP), San Diego Basin Plan and 2002 Clean Water Act Section 303(d) highlight sedimentation as a significant impact associated with urban encroachment and a leading cause in the rapid destruction of salt marsh habitat in LPL, making sediment reduction a management priority.

Project Description. This project furthers a comprehensive watershed approach by coordinating stakeholder efforts in reducing impacts to downstream habitats from sediment generated by non-point sources within the watershed. In conjunction with the State Department of Parks and Recreation, the State Coastal Conservancy, and the City of San Diego, the Los Peñasquitos Lagoon Foundation (LPLF) prepared the Los Peñasquitos Sediment Basin Project. Before the basin was designed, several studies were conducted. A Systems Analyses Report was created to update the characterization of LPL's habitats and systems, such as tidal channel hydraulics, and to account for the changes that have occurred in the past 20 years. A Sediment Study/Alternatives Designs Report analyzed sediment discharge from the watershed as related to sediment control needs. The Sediment Study utilized standard, widely

accepted models (i.e. Hydrologic: HEC-1; Hydraulic: HEC-2/HECRAS; Sediment Transport: FLUVIAL-12/HEC-6) to characterize sediment transport into the lagoon from the three main tributaries for 2-year, 5-year, 10-year and 100-year storm events. The Alternatives Designs Report utilized the information provided in the Systems Analyses Report and Sediment Study to select sediment management alternatives for each tributary. Based upon these studies, it was determined that constructing a basin to intercept sediment from Los Peñasquitos Creek would be the best alternative for protecting LPL's multiple beneficial uses since this tributary transports more than twice the sediment volume of the other two creeks combined. A project site was selected and a basin custom-designed specifically to maximize sediment interception while minimizing impacts to surrounding habitat and protecting nearby developments from flooding, as well as preserving view corridors of nearby residents. The project will consist of basin construction (3 months starting on 9/16/07 to avoid the breeding season of the Least Bell's Vireo and rain events), establishing an educational/outreach component and monitoring of the basin's performance for the duration of the contract and beyond.

Project Goals.

1. Protecting LPL from the impacts associated with rapid sedimentation from non-point sources in the western portion of the watershed by monitoring the success of the sediment basin constructed during the Los Peñasquitos Sediment Basin Project (Agreement # 06-136-559-0). This goal corresponds to the NSPCP purpose of protecting the beneficial uses of water through the control of non-point source pollution by a non-profit organization formed by landowners.

2. Contributing to the development of a TMDL target for sedimentation/siltation at LPL currently being established by SWRCB.

Objectives and Outcomes.

1A. Interception of a portion of bed-load sediment from Los Peñasquitos Creek (LPC) during moderate storm events (i.e. up to a 5-year event).

1B. Reducing annual rates of sediment input to LPL from LPC.

2A. Establishment of an accurate TMDL that will be effective in reducing overall sediment/siltation input into LPL.

Monitoring Plan

Constituents to be Monitored, Measurement Techniques and Data Quality Objectives.

Monitoring will consist of field surveys of sediment accumulation within the basin using a Sokia Set-5A total station and the Sokia SDR-33 electronic field data logger as the surveying instrument. The accuracy of the total station horizontally and vertically is several millimeters. A hand-held electronic field work book data logger is used to calculate and record the relative coordinates and elevations. The profile elevations within the basin will be determined using established markings on the basin's outlet riser and associated benchmarks to be selected after the basin is constructed relative to the elevation of a permanent local benchmark. The total station will be moved to multiple pre-determined locations to complete the survey.

Table 1. Data Quality Objectives for Field Measurements.

Group	*Parameter*	*Accuracy*	*Precision*	*Recovery*	*Target Reporting Limits*	*Completeness*
Field Measurements	*Topography within basin*	*.05 ft*	*.05 ft*	*NA*	*.03 ft*	*No SWAMP requirement: will use 80%.*

Monitoring Activities (Data Collection and Analysis)

- The basin will be surveyed before and after the rainy season (i.e. December – April) to assess sediment accumulation during this period.
- The basin will be surveyed after every significant rain event (i.e. 2-5 year event or greater) for a period of three years to assess sediment accumulation rates associated with moderate storm events and facilitate future maintenance activities.
- The basin will be surveyed annually to assess to sediment accumulation for the year.
- All surveyed data will be recorded along with the date in the Field Data Sheet, including dates and volumes of sediment removal.
    - The Field Data Sheets will be compiled into a monitoring log for each year.
- Data collected from each survey will be compared to the upstream USGS stream flow gauge to assess sediment transport of LPC to assess the success of the basin in intercepting portions of bed-load sediment from the Creek.
    - This comparison will be included in the quarterly and annual reports.

Monitoring Reports for the Sediment Basin.

The LPLF will be prepare quarterly monitoring reports that will include the following:

- Survey dates and field notes along with estimated sediment volumes.
- Dates and volumes of sediment removed during maintenance of the basin.
- Results and recommendations from each inspection.
- Whether suggested recommendations were carried out and on what date they were carried out.
- Flow rates from the upstream USGS gauge.
- A Storm Water Pollution Prevention Plan (SWPPP) and a Notice of Inspection (NOI) will be prepared for the maintenance and inspection program.

Maintenance Plan

Inspection Activities. The LPLF will be responsible for inspecting the sediment basin.

- The basin will be inspected after every significant storm event, when access is permissible by City Parks.
- During long-term storm events, the basin will be inspected at least every 24 hours, if/when access is permissible by City Parks.
- The basin will be inspected every 2 weeks during the rainy season, if/when access is permissible by City Parks.
- In addition to inspecting and monitoring for accumulated sediment, the basin will be inspected for:

  - The integrity of the outlet riser
  - Damage or erosion to the outlet embankment.
  - Erosion or slope failure along drainage paths from the upstream hillside.
- The outlet structure will be inspected for obstructions that can create standing water and impede hydraulic capacity.
- An Annual Inspection Report will be prepared by the Lagoon Foundation.
- A log will be maintained with dates of inspections and dates and volumes of sediment removal.
- The report will include the results and recommendations from each inspection.
- The report will note whether the recommendations were carried out and on what date.
- The flow from the upstream USGS gage will be included in the Annual Report.
- A Stormwater Pollution Prevention Plan (SWPPP) and NOI will be prepared for the inspection and maintenance program.

Inspection Reports for the Sediment Basin. A Registered Professional City Engineer will prepare a certified inspection report for the sediment basin once each year. These regular inspection reports will be on file with the Los Peñasquitos Lagoon Foundation for review by City staff. City of San Diego Streets Division will perform maintenance activities at the basin and brow ditch.

The certified annual inspection report will contain the following information:

1. Either a statement that no maintenance work was needed, or
2. A list of maintenance activities or repairs that will be required.
3. If repairs are required, a follow-up report will certify that repairs have been completed.

Maintenance Activities. When the LPLF's monitoring and/or inspection teams determine that enough sediment has accumulated to require sediment removal, the Foundation will notify the City of San Diego, Street Division, which will perform the required maintenance.

- Ongoing maintenance will be required at the sediment basin and will include both scheduled and unscheduled maintenance activities.
  - Scheduled maintenance includes annual removal of vegetation at the beginning of each winter season, and regular inspections for removal of trash and debris.
  - Unscheduled maintenance includes removal of sediment after major storm events, and potential repairs, usually made necessary by storms and floods.
- Markings on the outlet riser will indicate depth of sediment in the basin.
- Sediment will be removed when it reaches a maximum depth of two (2) feet.
- The outlet structure will be cleaned as needed to prevent standing water and to maintain hydraulic capacity.
- The brow ditch will be maintained as needed to insure integrity.
- An access ramp is provided to the basin floor for maintenance vehicles.
- Maintenance vehicles will enter the existing park access road at the existing locked gate on Vista Sorrento Parkway.
- A backhoe or excavator on the floor of the basin will load trucks on the ramp or on the existing access road.

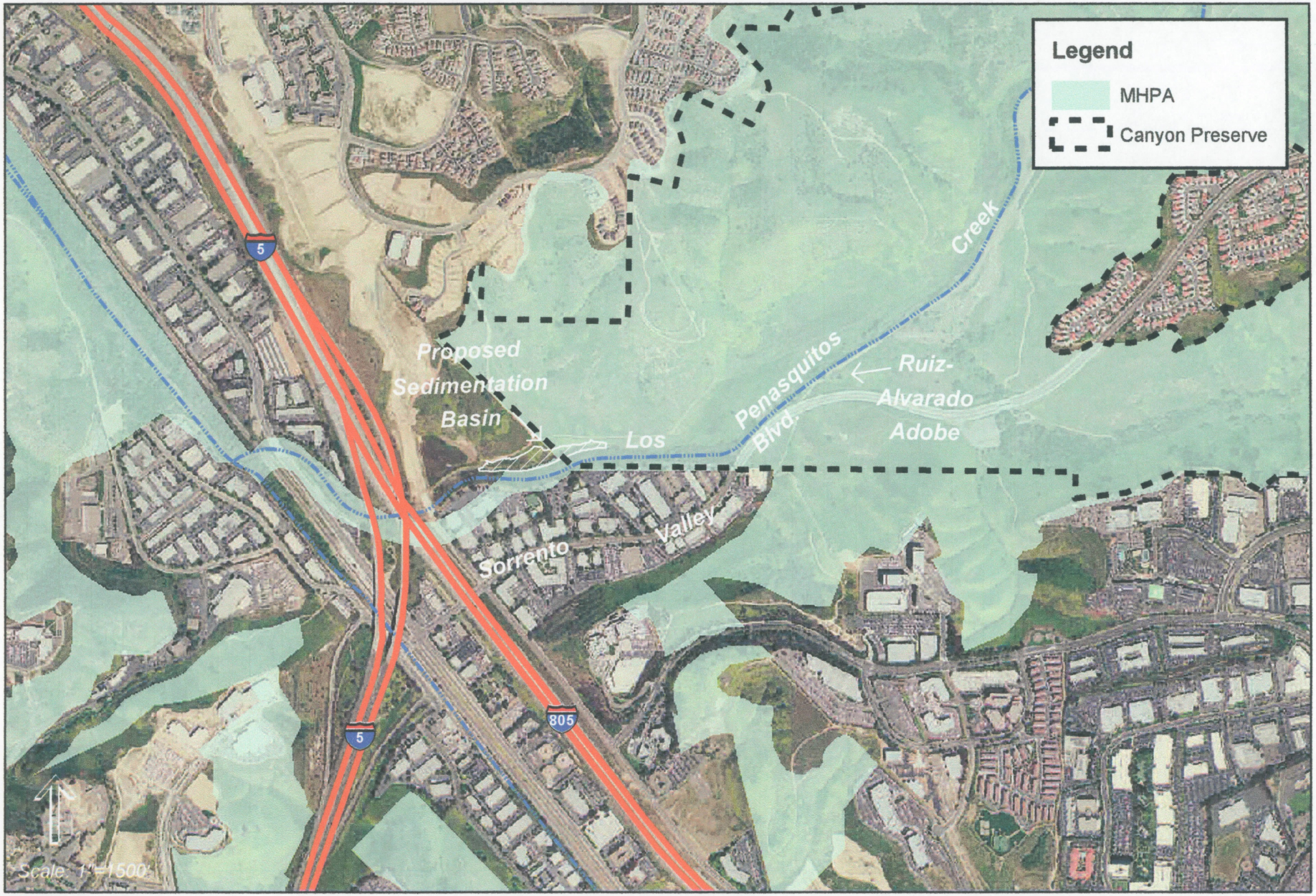
- The Lagoon Foundation will maintain any long term permits required for the regular maintenance of the basin.
- The normal annual maintenance cost is approximately $8,000.
- The basin will be cleaned at least once each year, even if the sediment depth has not reached the designated level.
    - This type of maintenance will consist of the removal of vegetation from within the basin.

Disposal of Basin Spoils. At this time LPLF is coordinating efforts with both City and State Parks to determine if sediment excavated from the basin can be used for maintenance activities (e.g. trail stabilization) within the Los Peñasquitos Canyon Preserve and/or the Torrey Pines State Reserve. If either City or State Parks agrees to use this sediment, then an agreement will be made regarding the storage of these spoils on City of State Park land. If an agreement cannot be made with either City or State Parks, then the spoils will be sent to the dump located in Miramar.

APPENDIX 1. Geographical Setting (Maps)

Figure 1
Regional Location Map

TIERRA
ENVIRONMENTAL SERVICES



Kimley-Horn
and Associates, Inc.

Figure 2

Vicinity Map

Los Penasquitos Sediment Basin Initial Study

Los Penasquitos Sedimentation Basin Initial Study

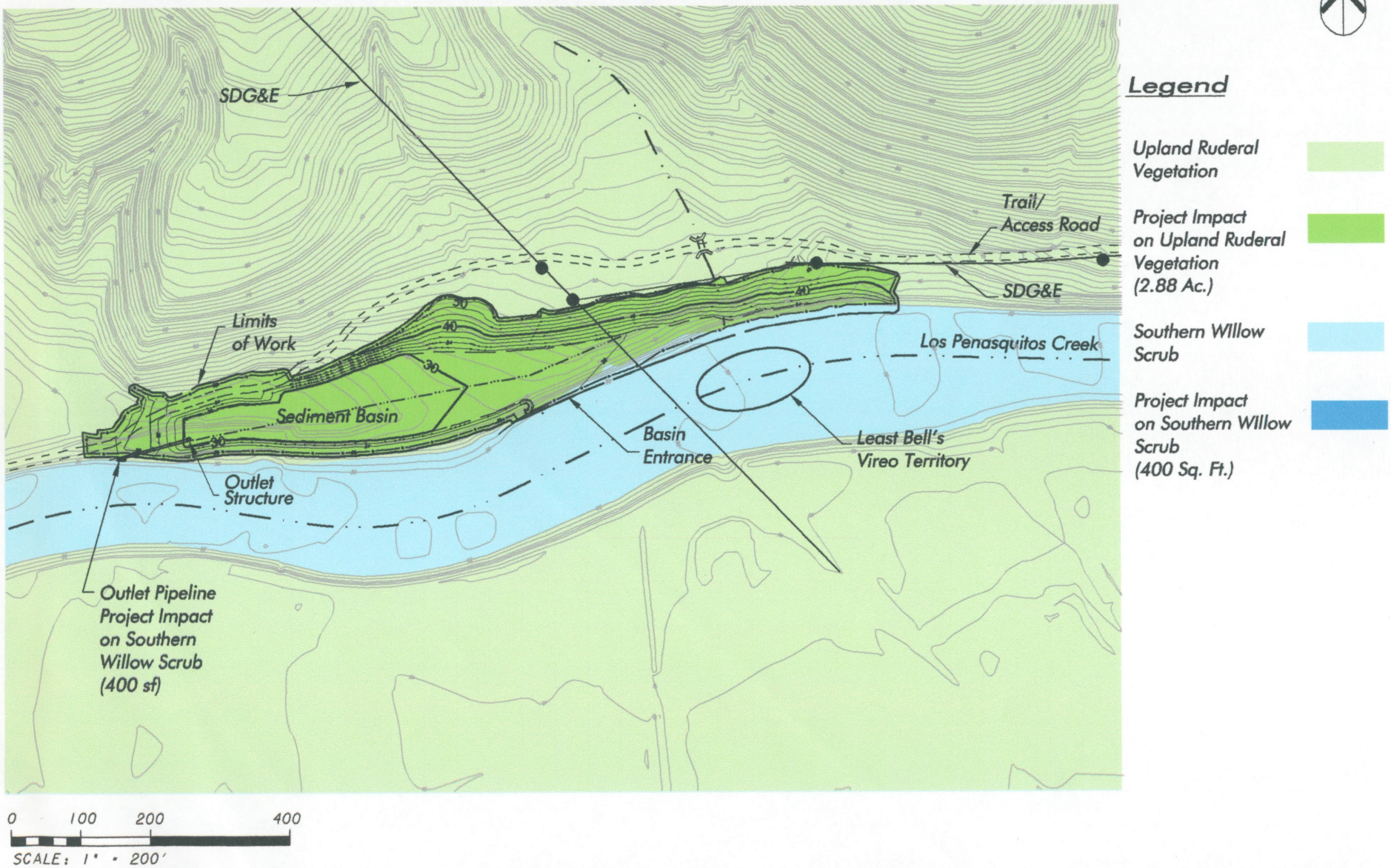


Figure 3

APPENDIX 2. FIELD DATA SHEET: Sample Monitoring and Maintenance Report

Sample Monitoring Report (Sediment Basin)

Date/Time	**Location** Survey Code, Station #, Position Coordinates	**Estimated Height of Sediment Within the Basin**	**Estimated Sediment Load Within Basin (cubic feet)**	**Estimated Sediment Load Removed from the Basin (cubic feet)***	**Storm Duration* (Total Rainfall)**	**River Flow Rate (USGS)***	**Notes & Recommendations**

* If necessary.